Death in the European family
A demographic approach using microsimulation

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Introduction

If death can been seen as one of the founding themes of demography, it is surprising to note how few researches have analyzed death from the point of view of the survivors. Questions like how many deaths of family members individuals had (or will have) to face, and at which ages, are rarely investigated in the literature. Previous researches have shown that the rise of life expectancy has postponed the experience of death inside the family (Monnier & Pennec, 2006; Uhlenberg, 1980). As a result, individuals from younger cohorts spend more time with their surviving kin than did their ancestors, know more of their ascending kin, but will have to mourn more family members than before.

This paper describes how the experience of death of family members has evolved since the mid-nineteenth century. It seeks to deepen and extend previous results both over time and space, by analyzing cohorts born from 1850 to 2000 in European countries (France, Sweden, Switzerland, Netherlands and England & Wales). Using microsimulation, it looks at how the experience of death has changed for specific kin (parents, grandparents, children, grandchildren, siblings and spouse). It also focuses on the total number of deaths cohorts have to face, as well as the rates at which death occurs in the family during the entire lifespan. Our main findings show that the experience of death in the close family has reached a historically low level, a result that has not been suggested by previous researches.

Data and methods

Data come from the microsimulations of individual biographies using a model built on *R*. Starting from a base population reproducing the one of 1850, the model progressively submits each individual to mortality and fertility risks until 2100. By keeping records of kin ties between individuals, microsimulation technique allows to reconstruct the entire kin network and therefore analyze the deaths that occur inside of the family.

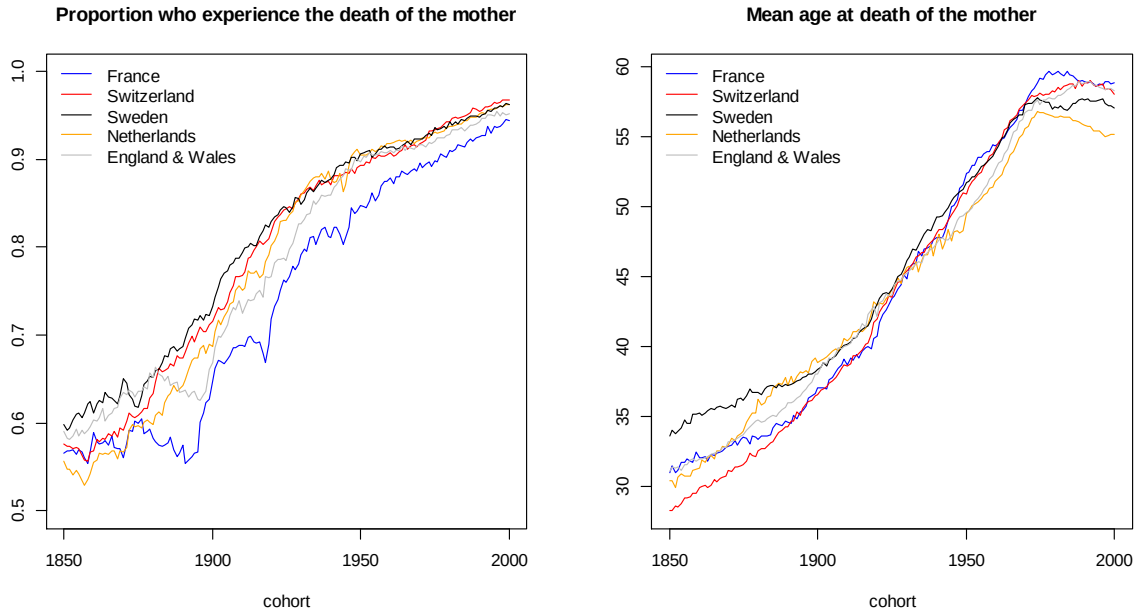
To run the simulations, prospective mortality risks and fertility rates are needed from 1850 to 2100. The mortality data come from the Human Mortality Database, and future trends are projected until 2100 according to the Lee-Carter model (Lee & Carter, 1992). The fertility rates come mainly from the Human Fertility Database, completed with historical estimates, and held constant after 2010. As the results are sensitive to maternal histories, all births combined fertility rates are decomposed into parity-specific ones using a model presented elsewhere (Pierrard, Zegarra & Rizzi, 2013).

The five countries have been selected to provide a contrasted look at different fertility and mortality. As they have been affected differently by wars and baby-boom, they can provide a closer understanding of how the experience of death is sensitive to historical events.

Preliminary results

As expected, our estimates show that the experience of death in the ascending kin network (parents, grandparents and great grandparents) has been increasing in cohorts, and delayed at older ages. In the case of parents, illustrated here by the death of the mother (Figure 1), the proportions of individuals who experience maternal loss has risen from less than 60% in 1850 to more than 90% for younger cohorts. In past times the loss occurred on average before the age of 35 but happens now between 55 to 60 years. The mean age at maternal loss, and thus the average time that individuals spend with their mother, has been stalling (even decreasing in the Netherlands) since the seventies due to the rise of the age at motherhood.

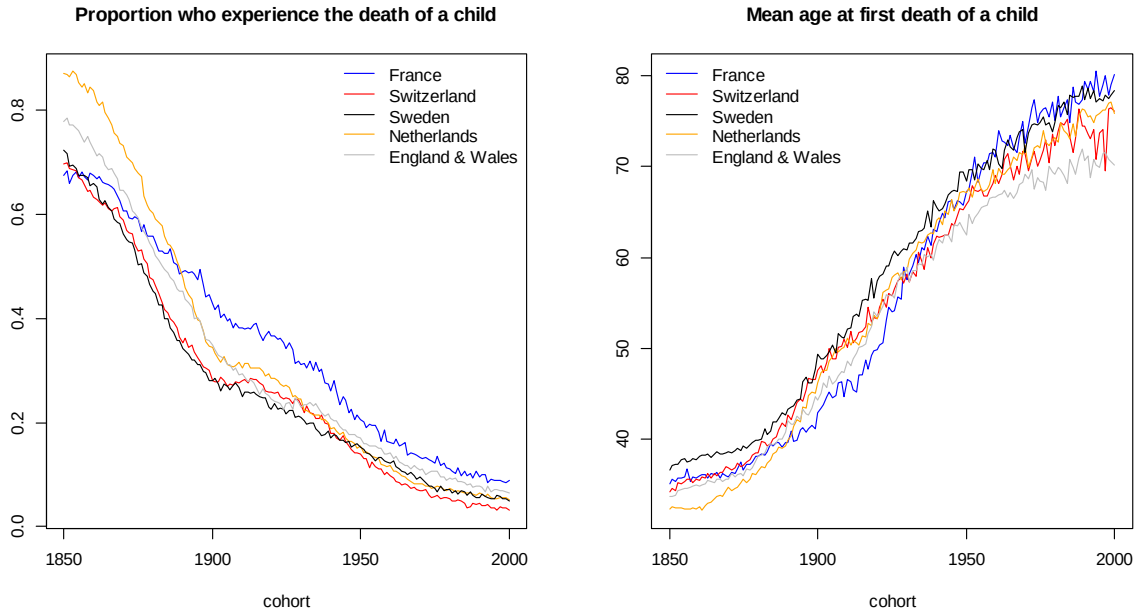
Figure 1. Maternal death



The same patterns are observed for paternal death, but in proportions higher than for mothers and at somewhat lower ages (figure not shown). Other results for the ascending kin show that the experience of death of grandparents is also more frequent.

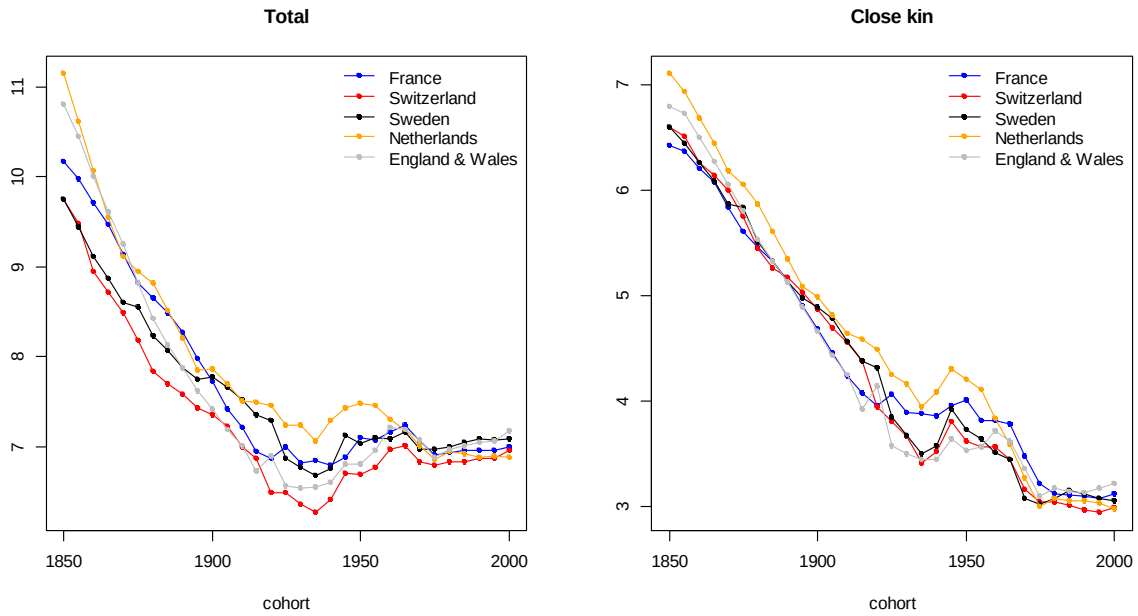
About the descending kin, the death of a child used to be quite common event, experienced by a majority of mothers (Figure 2, next page). Since the mid-nineteenth century, the proportions who have to bury one offspring has been declining dramatically, but is far from having completely disappeared; between 2% and 9% of mothers born around 2000 will have to mourn a child. Nevertheless, the mean ages confirms that when the death of a child occurs, it does when mothers have already reached old ages, reflecting that it concerns more the death of an adult child, compared to a young offspring in past times. The death of a grandchild, known by 20% to 25% of a cohort born in 1850, applies now to a low proportion (less than 1%) of those born around 2000 (figure not shown).

Figure 2. Death of a child



On average, the total number of deaths that individuals have to face shows a tendency to decrease[1] (Figure 3). From around 10 to 11 deaths in 1850, depending on the country, it has been stalling for most part of the last century at around 7 deaths in the large family (grandparents, parents, children, grandchildren, siblings and spouse). When looking at the close family only (grandparents and grandchildren excluded), the decline is even more pronounced, and suggests that younger cohorts will have to face a historically low number of deaths.

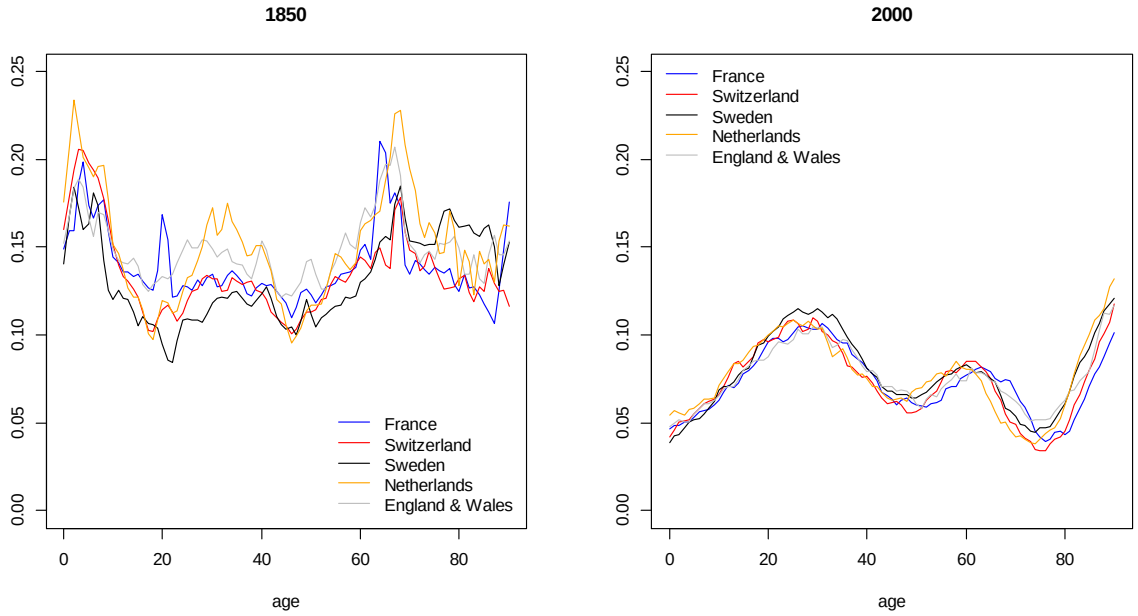
Figure 3. Mean number of deaths



[1] The increase found by previous researches is replicated when computed on total population, regardless of kin networks (including childless individuals, with no sibling, no surviving grandparents, etc.). The results presented here are computed on the population of individuals who know at least one of each kin, which are thus exposed to the risk of experiencing those deaths.

A last result show age-specific rates of death inside the family (Figure 4). Computed as classical demographic rates, they divide the total number of deaths experienced by individuals between ages x and x+1 by the number of person-years lived by the surviving population. Comparing the cohorts 1850 and 2000, one can clearly note how the experience of death has evolved toward a common trend in the five countries under study. In the past, death took its toll among the family during the entire lifespan of an individual, in a way highly affected by infant mortality and historical events such as wars. Nowadays, the rates at which kin members disappear are clearly concentrated around several ages, and tend to respect the order of generations, ancestors dying first followed by lateral kin and less often by offspring.

Figure 4. Age-specific rates of death experienced inside the family



Further improvements

Other variants of fertility and mortality will be tested to evaluate the sensitivity of the results to demographic forecasts.

References

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